AGILITY REFINER

Prepared by: Arshiya Khan (B.Tech ECE-I year)
Khyati Kiyawat (B.Tech ECE-I year)

Mentored by: Tanvi Sharma(B.Tech ECE-III year)

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CONTENTS

Overview

Shuttle run is a test which is required to improve agility of players. This test requires the person to run back and forth between two parallel lines as fast as possible. The coach randomly directs the player forward/ backward or left/right and a stop watch is kept to record time of each round.

The model agility refiner works the same way and reduces the task of coach. The manual instructions are replaced by the device and it gives average of time taken by player in ten rounds. This can be especially used by badminton player to test and refine their agility all alone. It can further be used by any sports person.

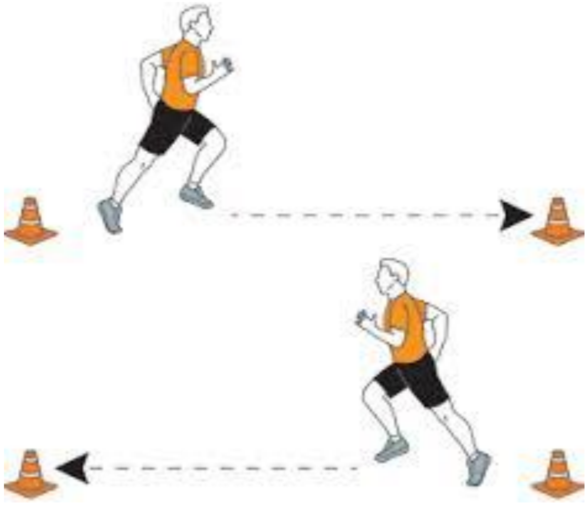


Figure 1: Shuttle run by giving manual commands

Components Used

- Arduino UNO
- Lcd Display
- Laser
- LDR(light dependent resistor)
- Push buttons
- Leds
- Jumper wires
- Resistors
- Perf board

Process Explained

An arduino is connected to an LDR sensor, which is placed in the middle of the running track along with LCD screen and two LEDs which glow to direct the player.

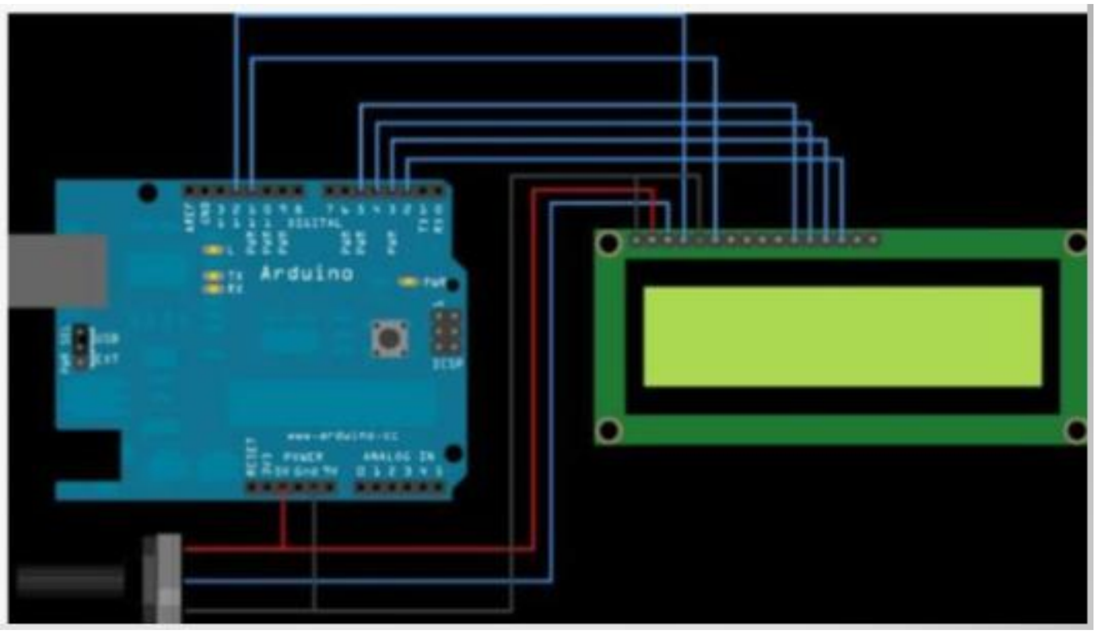
At the end of the track there are push buttons which determines the presence of of the player at the end. The LDR sense the presence of the player in the middle of the track where the led show the direction for next round and lcd prints the time taken in the previous round. A laser light is projected over the LDR to make the sensing better.

In this way,first the led glow to direct the player, the direction is randomly generated by th arduino. Then player rush along the track and press the push button to show he/she has actually reached there and come back in the middle, the ldr senses the player and the system generates another random direction after showing the calculated the time in each round. At the LCD screen displays the average time taken by the player to cover ten random rounds.

The following links will help you know the circuit and code the will let you know about the implementation using arduino.

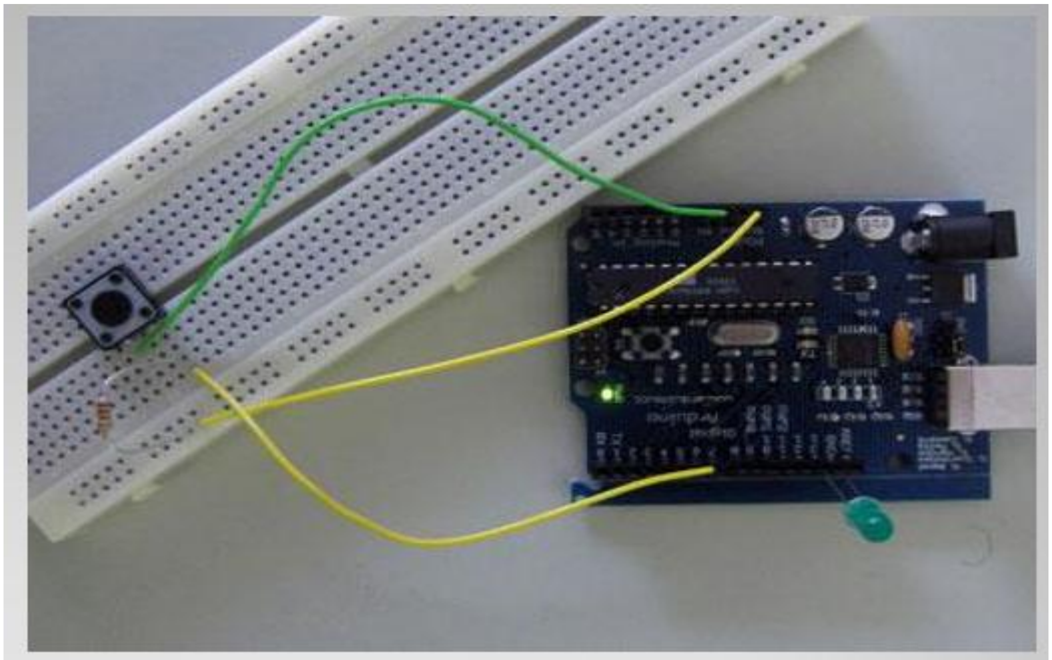
Connections and links

1. LCD display



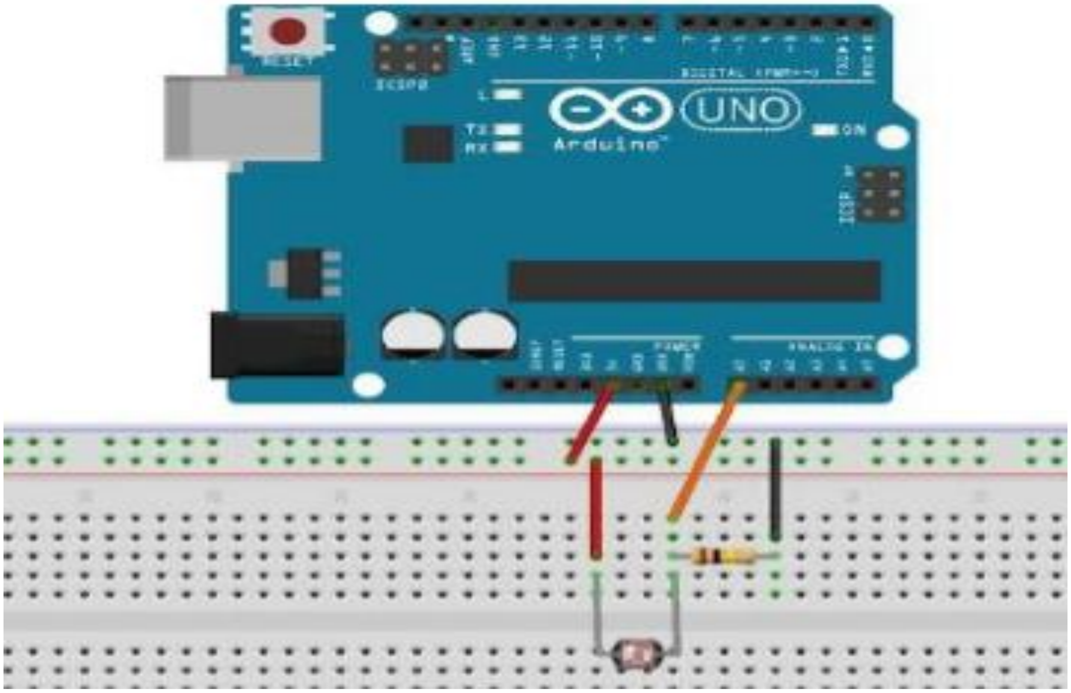
http://www.instructabls.com/id/Connecting-an-LCD-to -the-Arduino/

2. Push Button



https://www.arduino.cc/en/tutorial/pushbutton

3. LDR



https://diyhacking.com/arduino-ldr-sensor

Arduino code

```
#include<LiquidCrystal.h>
LiquidCrystal lcd(12, 11, 5, 4, 3, 2);
int sensorPin = A0;          // select the input pin for ldr
int sv = 0;                     //for ldr
int flag = 0;
int val = 0;                   //read from push button
int pushbutton1 = 7;
int pushbutton2 = 8 ;
int ledpin1 = 13;
int ledpin2 = 10;
unsigned long t_time = 0, s_time, e_time, r_time;
int rounds = 0, Random = 0;
unsigned long TimeinEach(int pushbutton, int led)
{ s_time = millis();
  flag = 0;
  val = digitalRead(pushbutton);
  while (val != LOW)
      val = digitalRead(pushbutton);

 if (val == LOW)
  { digitalWrite(led, LOW);
    flag = 1;                               //push button is pressed
    sv = analogRead(sensorPin);
    lcd.clear();
  }
  while (sv > 100 && flag == 1) //getting back to lcd screen
  {
    digitalWrite(led, LOW);
    sv = analogRead(sensorPin);
  }
  e_time = millis();
  r_time = e_time - s_time;
  lcd.print(r_time/1000.0);
  return r_time;                                   //time taken in each round
}

void setup() {
  pinMode(pushbutton1, INPUT);
  pinMode(pushbutton2, INPUT);
  pinMode(ledpin1, OUTPUT);        //digital inputs are to be defined not ldr
  pinMode(ledpin2, OUTPUT);
  lcd.begin(16, 2);
  randomSeed(analogRead(A0));
  Serial.begin(115200);                         //sets serial port for communication
}

void loop() {
  lcd.setCursor(0, 0);
  lcd.print("let's begin!!!");
  Serial.println("let's begin!!!");
  delay(2000);
 lcd.clear();
  while (rounds < 10)
  {
    Random = random(1, 3);                          //generates 1 or 2
    if (Random == 1)
    {
      digitalWrite(ledpin1, HIGH);
      lcd.print(rounds + 1);
      t_time += TimeinEach(pushbutton1, ledpin1);
      delay(1000);
      lcd.clear();
      rounds++;
    }
    else
    { digitalWrite(ledpin2, HIGH);
      lcd.print(rounds + 1);
      t_time += TimeinEach(pushbutton2, ledpin2);
      delay(1000);
      lcd.clear();
      rounds++;
    }
  }
  lcd.print("You did it!!!");
  delay(1000);
  lcd.clear();
  lcd.print("your average");
  delay(1000);
  lcd.clear();
  lcd.print(t_time / 10000.0);                //average over 10 rounds
  lcd.print(" s");
  delay(1000);
  lcd.clear();
  delay(1000);
  lcd.print("ALL THE BEST");
  delay(2000);
}
```

Further implementation

We can store the code in Atmega to eliminate the use of arduino and a potentiometer can be used to control and set the number of rounds player have to run. Moreover code can be developed to show grades to the player according to his/her performance.